

# Performance of baited underwater video for estimating abundance of spiny lobsters

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## Objective

We set out to design and build an baited underwater video (BUV) apparatus to sample *Palinurus elephas*, a deep-water spiny lobster (0-200 m - optimal range 40-90 m).

## What are the advantages of BUV?

- Can check images as many times as necessary
- Useful records of abundance, richness and behavior
- Non-extractive so well suited in marine protected area (MPA)
- Not depth limited as are surveys conducted by divers

## Are lobsters good candidates for BUV?



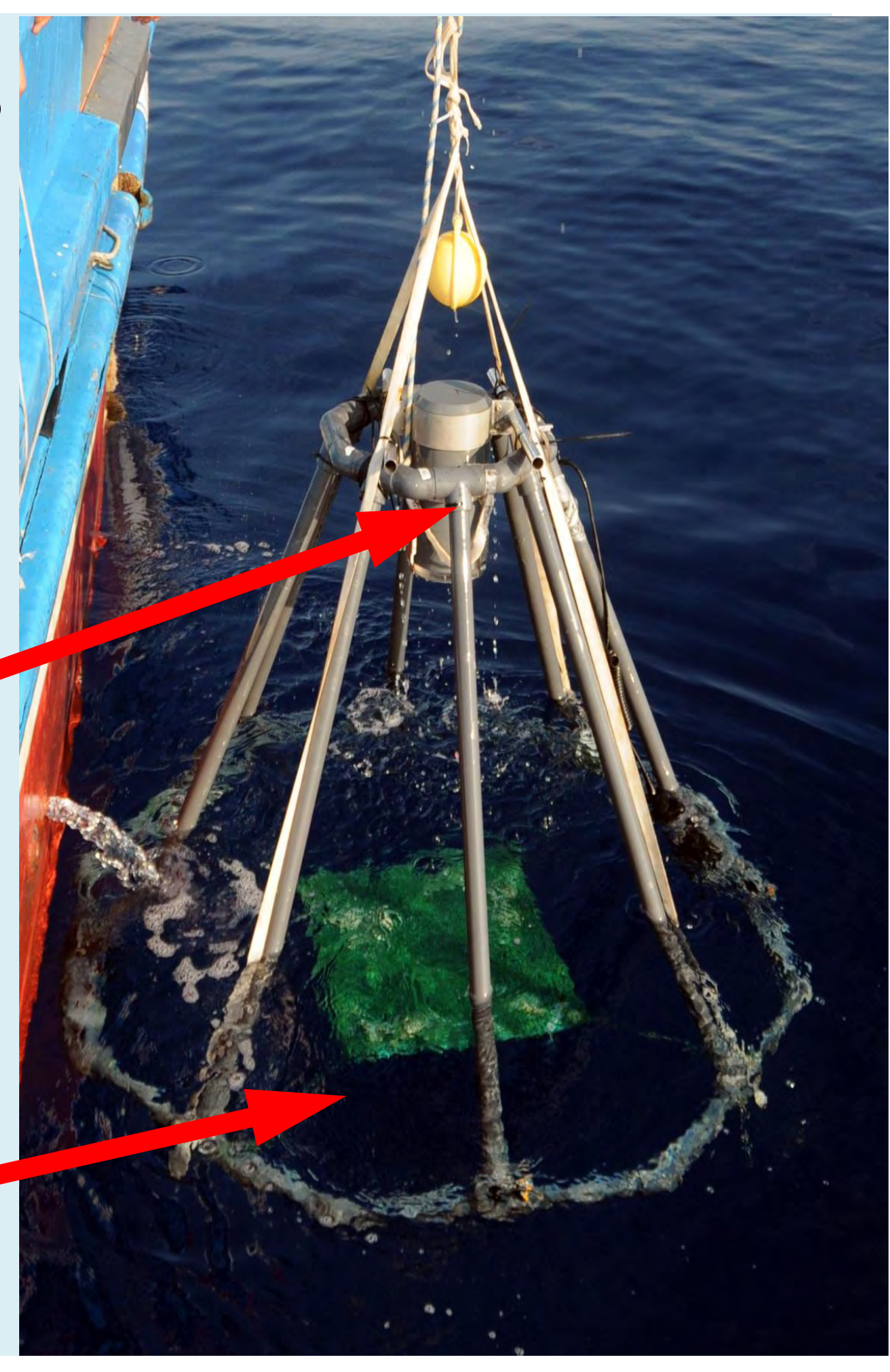
- They are attracted to bait due to scavenging habits
- Most *P. elephas* live too deep for diver surveys
- We need non-extractive methods for sampling lobsters (e.g. MPAs)

## Methods

The Lobster Video Evaluation (LoVe) unit had to be economical and easy to build so we could construct more low cost units and ensure adequate sample replication.

### LoVe Lobster Video Evaluation Technical Features

- PVC tubing octopod with octagonal base = strong, stable and cheap to build and "off the shelf" components reduce costs
- Digital video camcorder in a PVC underwater housing
- Camera view 90 x 60 cm
- Dusk deployment - 5 HOURS FILMING limited by light source
- Mesh bait bag (60 x 40 cm)

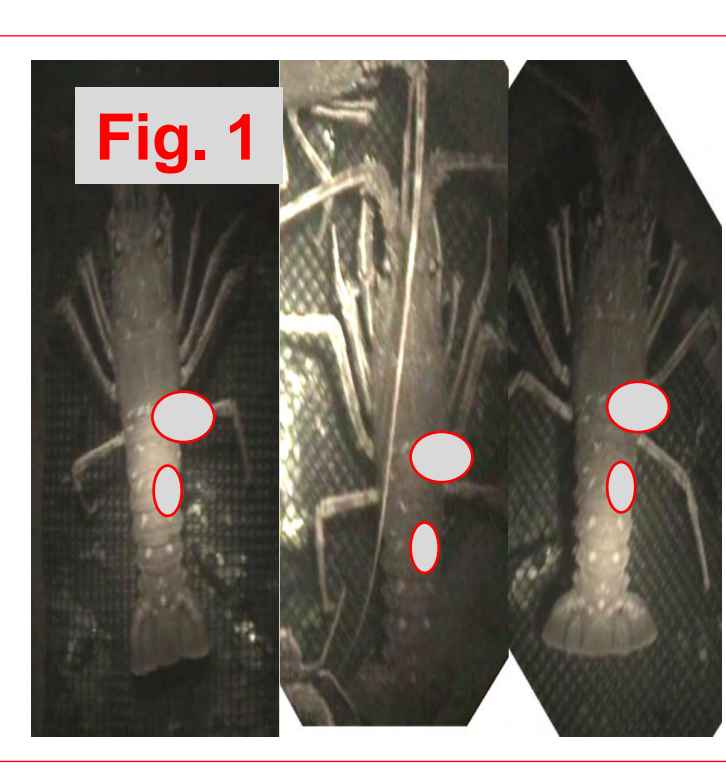


## Data

Data are from 27 deployments (2006 – 2009) at the Columbretes Islands Marine Reserve and adjacent fishing grounds: n=17 inside the MPA; n=4 in newly created protected zone (NEW); n=6 at MPA border (OUT) at between 45 and 70 m depth.

### From the video we recorded:

- Time of first appearance for each lobster (**T1**)
- Max N<sup>o</sup> appearing in single video frame (**Nmax**)
- Max N<sup>o</sup> for the entire video (**Ntot**) see Fig. 1
- Length (total, carapace and left/right antenna)
- Presence of other species for interaction studies



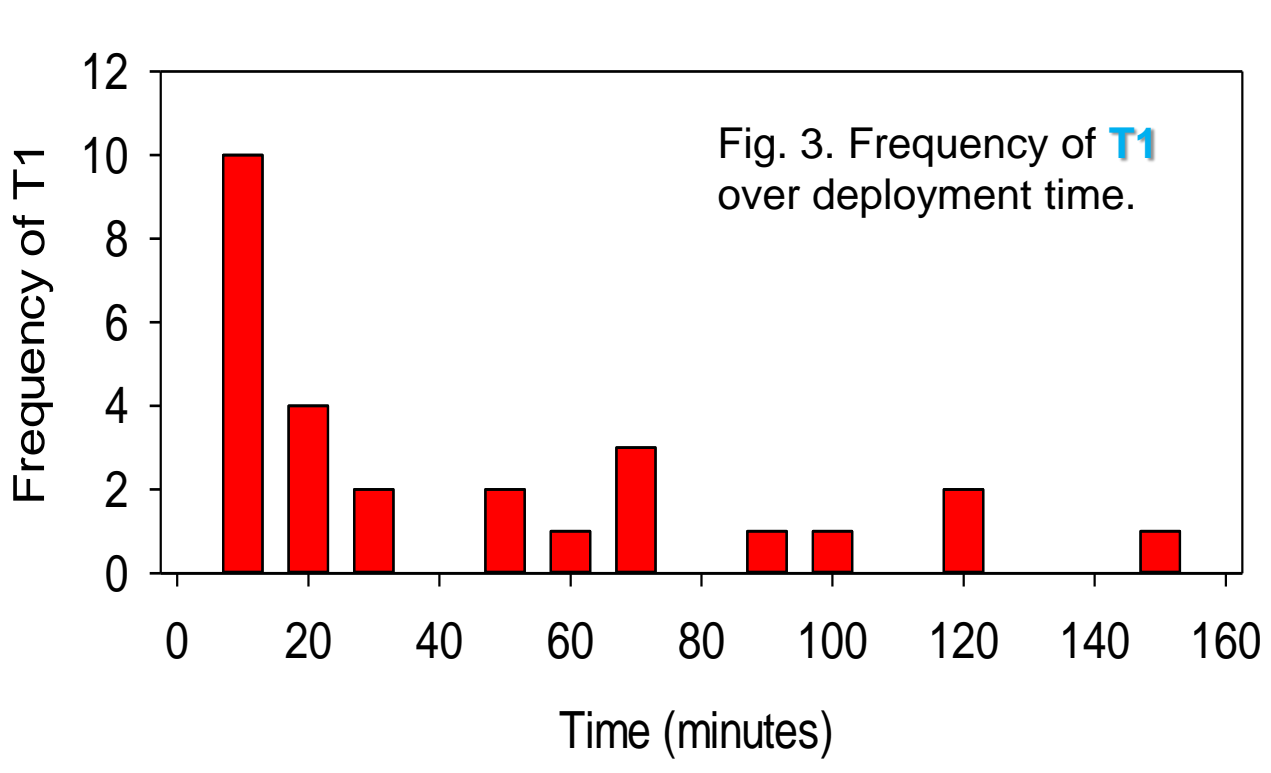
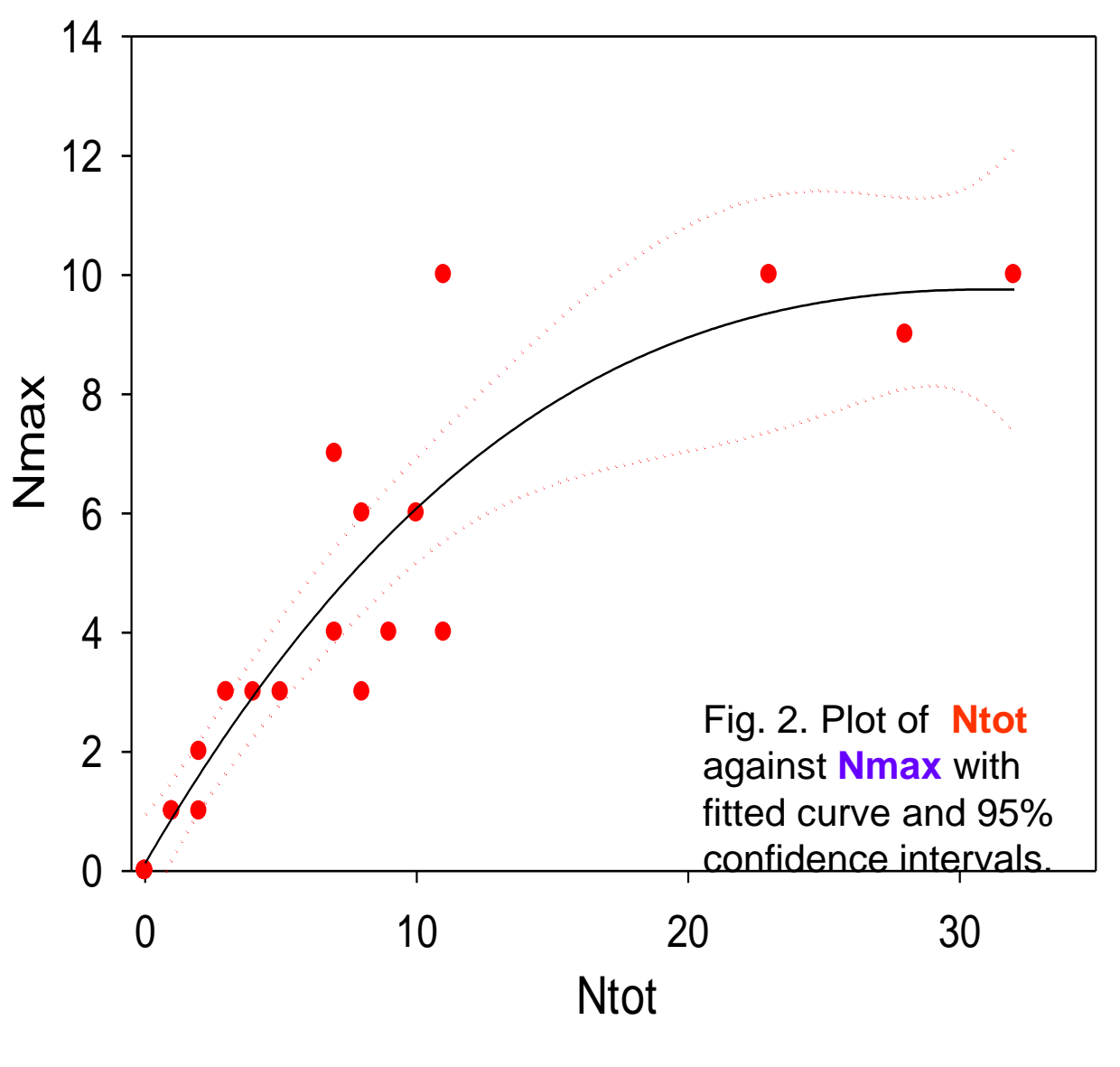
### New Variable:

Normally BUV abundance is represented by **Nmax** so individuals are not counted more than once. This tends to underestimate the true number of individuals. For lobsters we can use images of unique body patterns or damaged antennae to identify and track individuals over time, and thus obtain **Ntot**, which is closer to the true number of lobsters attending the bait.

## Results & Discussion

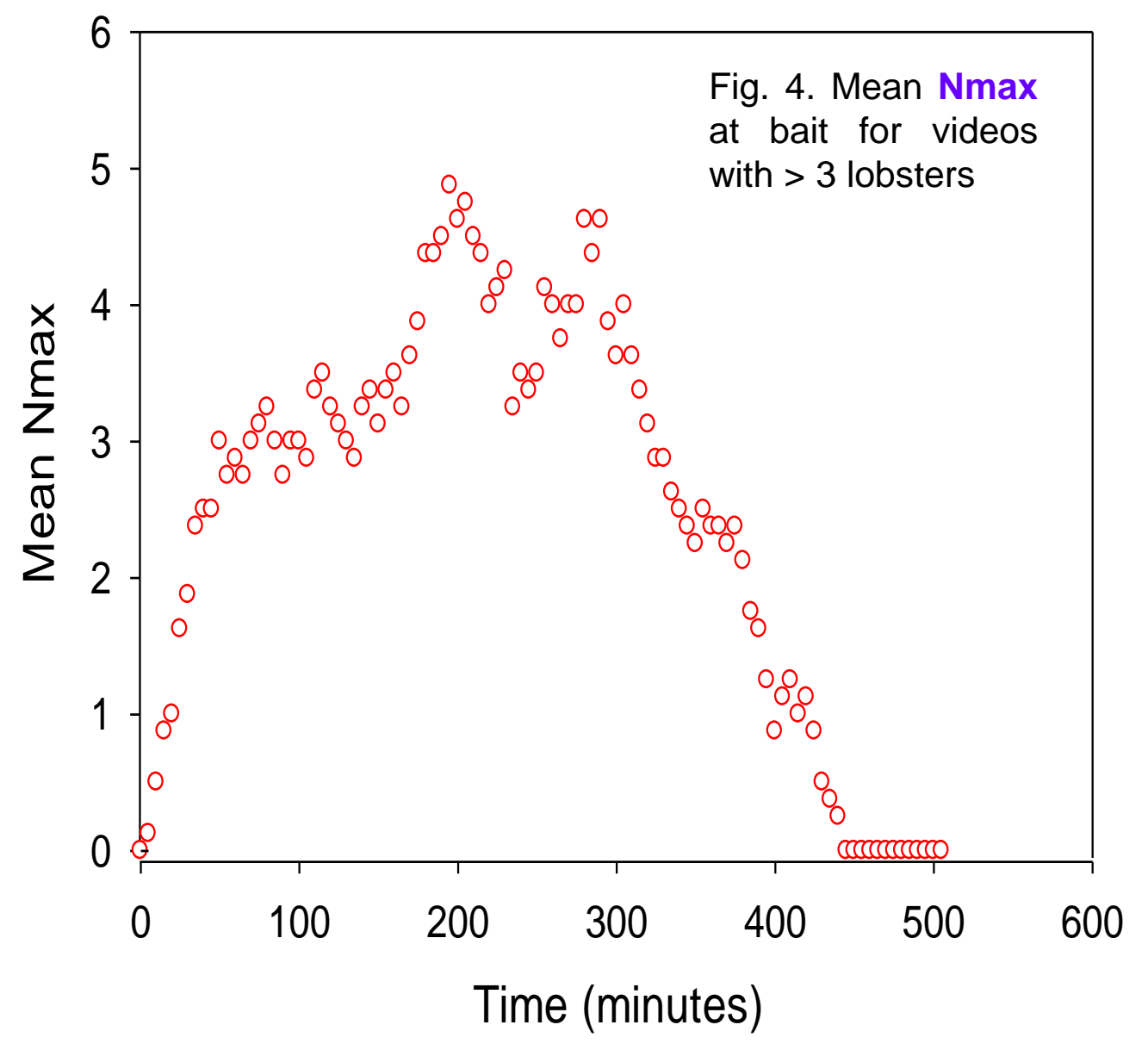
### Space limitations

The maximum number of lobsters **Nmax** levelled at 10, while that for **Ntot** continued increasing to 31. Therefore an **Nmax** of ~10 appears to be the highest this variable can reach, likely due to space limitation at the bait bag (Fig. 2).



### Speed of appearance

Most lobsters appear at the BUV within the first hour of video deployment (Fig. 3).

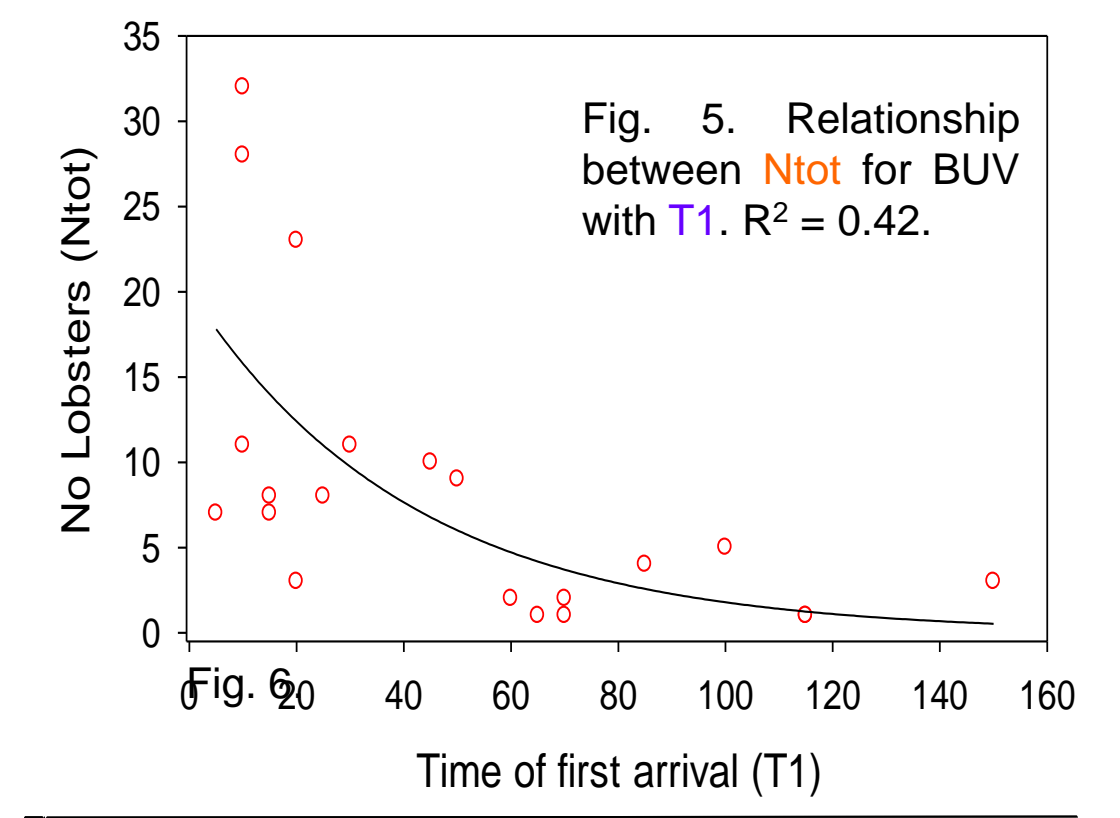


### Peak abundance

There is an initial rapid increase in lobster abundance followed by a slower rise to a peak at ~3.5 hours. After this there is a steady decline which suggests bait performance decreases as it is consumed (Fig. 4).

### Arrival time vs Abundance

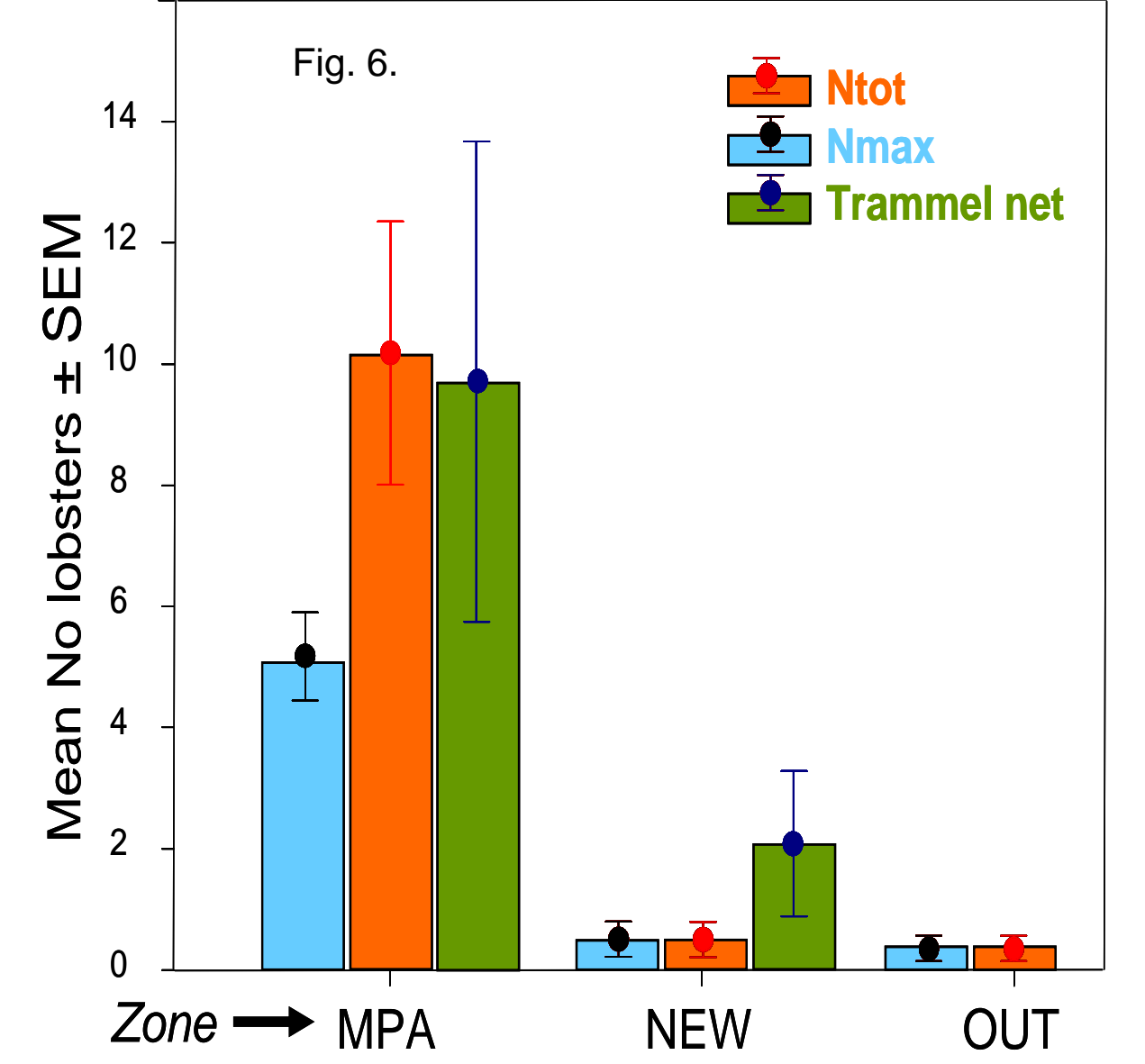
The higher the lobster abundance (**Nmax** or **Ntot**), the faster the time of first lobster arrival (**T1**). This suggests that the number of lobsters counted is related to true abundance, a key property needed to make the BUV a valid survey tool (Fig. 5).



### Is it useful?

The LoVe system demonstrates the clear difference between lobster abundance inside and outside the MPA. This is in agreement with results from experimental fishing with trammel-nets.

For example, in 2009 (6 hauls in MPA, 3 hauls in NEW), mean number of lobsters caught in nets was surprisingly similar to mean **Ntot** (Fig. 6). Mean **Nmax** is approximately half the value of **Ntot** inside the MPA at high lobster abundance, but equivalent outside where lobster density is low.



### The LoVe System

- Cheap to build and data are easy to retrieve from the recordings
- Rapid **T1** and peak of lobsters at bait within recording time suggests the BUV is capturing a representative sample
- Measurement of useful features is easy and accurate (not shown)
- Individual lobsters can be identified allowing **Ntot** estimate
- New abundance estimates **Ntot** are within the same range of those obtained with trammel nets, comparison with which will be the focus of ongoing research.